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A study of the intelligence and scholarship scores of graduates of teaching curriculums in the major departments at Indiana State Teachers College

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A STUDY OF THE INTELLIGENCE AND SCHOLARSHIP SCORES OF
GRADUATES OF TEACHING CURRICULUMS IN THE MAJOR
DEPARTMENTS AT INDIANA STATE TEACHERS COLLEGE

A Thesis

Presented to
the Faculty of the Graduate School
Indiana State Teachers College

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Education

by
Agnes Claudine Dodds

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The thesis of Agnes Claudine Dodds,
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credit.

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CHAPTER I

THE PROBLEM, REVIEW OF LITERATURE, AND PROCEDURE

Since schools were established some subjects have been considered more difficult than others, and those who succeeded in the difficult subjects have been accredited with intellectual superiority. Seldom has the extent or degree of the supposed intellectual superiority been scientifically scrutinized for determination of the reality of its existence.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to determine the quality of the intellectual abilities of the students in each of the various major departments and to determine the extent to which the students earn scholarship indices which correspond to their percentile ranks in intelligence.

Importance of the study. It has long been accepted that people are happiest and best adjusted when they are associated with groups of similar ability. Therefore, it is necessary that college advisers should be able to guide students in entering fields in which they will have a fair chance in competition with their fellow students. Few scien-

tific studies have been made which give information concerning the relative intellectual abilities of students in the different groups. None have been made which reveal the significance of the differences in intellectual ability for each of the major groups.

II. REVIEW OF LITERATURE

One study¹ indicates that the mental abilities of the students in the different groups vary by showing that those of a high mental level tend to choose certain majors while those of a lower mental level tend to select other fields.

Noland² has revealed differences in the scholastic successes of physical education students and music students at the Kansas State Teachers College of Emporia.

An investigation,³ conducted at Indiana State Teachers

¹ Allen S. Hurlburt, Relationship between Intelligence Test Ranks and Selection of College Courses, (unpublished Master's thesis, Cornell University, Ithaca, 1936), 55 pp.

² Richard C. Noland, A Comparative Study of the Scholastic Success of Athletes, Musicians, College Women and College Men at Kansas State Teachers College of Emporia for the First Semester of the Academic Year 1934-1935, (unpublished Master's thesis, Kansas State Teachers College of Emporia, Emporia, 1936), 41 pp.

³ Orville C. Hochstetler, A Study for the Improvement of Teacher Training in the Indiana State Teachers College, (unpublished Master's thesis, Indiana State Teachers College, Terre Haute, 1936), 46 pp.

College, showed that students of the different departments vary from other groups in intellectual abilities and in scholarship indices. The average percentile rank in intelligence and the average scholarship index for each of a number of major groups were determined. But the standard errors of these averages and the true significance of the differences were not computed.

Definite and practical indications of which major fields students of specific mental abilities would be best fitted for teaching could not be derived from these studies. While the selection of fields will always be made with consideration of general natural abilities and special aptitudes, it is felt by the author that the information revealed in this study will be an aid in solving a difficult problem in the education of students for the profession of teaching.

III. ORGANIZATION OF REMAINDER OF THE THESIS

An explanation of the major fields, the group of students, the data concerning intellectual abilities, and the statistical computations used in the study are given in the remaining portion of Chapter I. The results of the study are set forth in Chapter II. The final chapter summarizes and makes known the conclusion derived from the study.

IV. PROCEDURE

Major fields studied. The major fields which were studied included each of the fields in which students at Indiana State Teachers College may qualify for license to teach in the state of Indiana, namely: art, commerce, elementary education, English, French, home economics, industrial arts, Latin, library science, mathematics, music, physical education (for men), physical education (for women), science, social studies, and speech.

Group of students studied. The students studied were all graduates of teaching curriculums who had not had teaching experience prior to the time of graduation. All such students who completed requirements for graduation during the year of 1941 and before the summer session of 1942 were used in the study. Students who majored in more than one field were considered as a member of each group in which a major was completed. The 342 students studied had completed a total of 741 majors.

Data used. Two sets of data were used. The first was the percentile rank in intelligence for each student as determined at Indiana State Teachers College by the psychological examination given to each new student soon after his matriculation. These data were available through the

files in the office of the dean of instruction. The second set of data was the scholarship index of each student computed for the period preceding the term in which graduation requirements were met. These data were obtained from records in the office of the registrar.

Statistical computations. The statistical procedure was to determine the mean and its standard error for the percentile ranks in intelligence and for the scholarship indices of the entire group of 342 students and of each major group. The formulas by which the means and their standard errors were computed were $M = \frac{\sum X}{N}$ and $S.E.M = \sqrt{\frac{\sum X^2}{N}}$. After the standard errors of the means for the percentile ranks in intelligence and for the scholarship indices of each group had been determined, the standard error of the difference between the mean percentile rank in intelligence of the entire group and the mean percentile rank in intelligence of each major group and the standard error of the difference between the mean scholarship index of the entire group and the mean scholarship index of each major group were determined by application of the following formula $S.E.(diff)M_1-M_2 = \sqrt{(S.E.M_1)^2 + (S.E.M_2)^2}$. The critical ratios of the percentile ranks in intelligence of the entire group and the percentile ranks in intelligence of each major group and the critical ratios of the scholarship indices of the

entire group and the scholarship indices of each major group were determined by the formula $C.R. = \frac{D}{S.E.(diff)}$. The critical ratios were later translated into the number of chances in one hundred of a true difference between the two groups greater than zero.

The coefficients of correlation of the percentile ranks in intelligence to the scholarship indices were computed for each group by the following formula $r = \frac{\sum xy}{\sqrt{\sum x^2} \sqrt{\sum y^2}}$. The probable error of the coefficients of correlation were derived by use of the formula $P.E._r = \frac{.6745(1-r^2)}{\sqrt{N}}$.

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CHAPTER II

RESULTS OF THE STUDY

It was the purpose of this chapter to compare the mean percentile rank in intelligence and the mean scholarship index of each major group with that of the entire group. The order rank of the mean percentile rank in intelligence was compared with the order rank of the mean scholarship index of each group. The coefficients of correlation of percentile ranks in intelligence to scholarship indices in each group were also revealed.

I. COMPARISON OF THE MEAN PERCENTILE RANKS IN INTELLIGENCE

The highest mean percentile rank in intelligence was that of the group who majored in French. Their mean percentile rank in intelligence was approximately 76, and it exceeded the mean percentile rank in intelligence of the entire group by about 20 points. The critical ratio of 4.4 indicated that there was very little overlapping of degree of intellectual ability in the two groups, and that the chances, to the nearest whole chance, were one hundred in one hundred that there was a true difference in the mental ability of the two groups greater than zero.

The lowest mean percentile rank in intelligence was that of the group who majored in physical education for men.

Their mean percentile rank in intelligence was approximately 37 and was exceeded by about 19 points by that of the entire group. The critical ratio of 5.1 indicated that there was even less overlapping of the degree of mental ability present in these two groups than in the group who majored in French and the entire group. The chances are one hundred in one hundred that the group majoring in physical education for men were mentally inferior to the entire group of students.

Table I on page 10 reveals for each major group: the number of students, the mean percentile rank in intelligence, the critical ratio, and the number of chances in one hundred of true difference in percentile rank in intelligence from the entire group of students. The results revealed for the groups who majored in French, speech, and library science were not as statistically reliable as the results for the other groups because of the smallness of the number of students in each of these.

II. COMPARISON OF THE MEAN SCHOLARSHIP INDICES

The mean scholarship indices of the various major groups varied from about 7 points above to about 6 points below the mean scholarship index of the entire group. The groups who majored in French, Latin, speech, mathematics, music, English, social studies, commerce, and elementary education earned mean scholarship indices which were higher

than the mean scholarship index of the entire group. The mean scholarship indices of the groups who majored in art, library science, industrial arts, science, home economics, physical education for women, and physical education for men were lower than that of the entire group. The values of the mean scholarship indices and the chances in one hundred of a true difference between each group and the entire group are given in Table II on page 11.

III. ORDER RANK OF PERCENTILE RANKS IN INTELLIGENCE AND SCHOLARSHIP INDICES

Four of the groups earned the same order rank in intelligence as in scholarship. The group who majored in French ranked first in each, and the group majoring in Latin ranked second. The home economics students had an order rank of 15 in both cases, and the students who majored in physical education for men ranked last in percentile rank in intelligence and in scholarship index.

Some of the groups ranked higher in scholarship index than in percentile rank in intelligence. The most noticeable of these was the mathematics group, whose scholarship rank exceeded that of its intelligence by 4 points. The scholarship ranks of the students of industrial arts, art, and elementary education exceeded the intelligence ranks by 3 points.

TABLE I

COMPARISON OF THE MEAN PERCENTILE RANK IN INTELLIGENCE OF
EACH MAJOR GROUP WITH THAT OF THE ENTIRE GROUP

Major group	Number of students	Mean percentile rank in intelligence	Critical ratio	Chances in 100 of true difference
French	14	76.286±4.304	4.431	100
Latin	21	74.250±5.268	3.321	100
English	114	70.009±2.226	5.159	100
Speech	15	64.071±6.305	1.241	89
Social studies	57	61.173±4.229	1.145	87
Music	37	59.444±4.820	.677	75
Commerce	97	58.289±2.813	.708	76
Mathematics	38	57.947±4.987	.370	64
Library science	12	54.583±9.373	.151	56
Science	69	54.433±3.474	.416	65
Elementary education	46	51.971±4.496	.850	80
Physical education (W)	28	50.893±4.953	.987	84
Art	35	49.800±4.375	1.339	91
Home economics	72	48.507±3.482	1.970	98
Industrial arts	44	43.182±4.556	2.666	100
Physical education (M)	42	36.829±3.404	5.129	100
Entire group	342	56.015±1.551		

TABLE II

COMPARISON OF THE MEAN SCHOLARSHIP INDEX OF EACH MAJOR GROUP WITH THAT OF THE ENTIRE GROUP

Major group	Number of students	Mean scholarship index	Critical ratio	Chances in 100 of true difference
French	14	73.586±4.153	1.744	96
Latin	21	73.085±2.952	2.260	99
Speech	15	70.579±2.522	1.660	95
Mathematics	38	70.568±2.005	2.046	98
Music	37	70.011±2.394	1.514	93
English	114	68.963±1.227	1.946	97
Social studies	57	67.863±1.886	.807	79
Commerce	97	67.336±1.162	.812	79
Elementary education	46	66.417±1.953	.081	53
Art	35	66.051±2.103	.091	54
Library science	12	64.833±3.439	.405	65
Industrial arts	44	64.391±1.576	1.089	86
Science	69	62.930±1.200	2.426	99
Home economics	72	62.714±1.220	2.551	99
Physical education (W)	28	61.332±1.994	2.346	99
Physical education (M)	42	60.132±1.505	3.725	100
Entire group	342	66.251±.659		

In other groups the converse was true. The order ranks of the mean percentile ranks in intelligence of the groups majoring in physical education for women, science, and English exceeded the order ranks of the mean scholarship indices by 3 points. The order ranks of all the groups in mean percentile rank in intelligence and in mean scholarship index are given in Table III.

IV. COEFFICIENTS OF CORRELATION OF PERCENTILE RANKS IN INTELLIGENCE TO SCHOLARSHIP INDICES

The coefficients of correlation of the percentile ranks in intelligence to the scholarship indices within the groups and the probable errors of the coefficients of correlation are given in Table IV on page 14.

The table shows that there is almost no correlation between percentile rank in intelligence and scholarship index of students who majored in industrial arts. The correlation between the two factors was very low for the students who majored in physical education for men, and the relationship between intelligence and scholarship of the science students was too small to be of any significance.

The coefficient of correlation for the students in the field of elementary education was rather high and indicated that students did earn scholarship indices which corresponded to their intellectual abilities in this field.

TABLE III

ORDER RANK OF MEAN PERCENTILE RANKS IN INTELLIGENCE
AND MEAN SCHOLARSHIP INDICES

Major group	Intelligence	Scholarship
French	1	1
Latin	2	2
English	3	6
Speech	4	3
Social studies	5	7
Music	6	5
Commerce	7	8
Mathematics	8	4
Entire group	9	10
Library science	10	12
Science	11	14
Elementary education	12	9
Physical education (W)	13	16
Art	14	11
Home economics	15	15
Industrial arts	16	13
Physical education (M)	17	17

TABLE IV

COEFFICIENTS OF CORRELATION OF PERCENTILE RANKS IN
INTELLIGENCE TO SCHOLARSHIP INDICES

Major group	Coefficient of correlation
Elementary education	.712±.056
Social studies	.595±.060
Latin	.582±.100
Library science	.575±.130
Home economics	.570±.055
Mathematics	.567±.074
Speech	.558±.124
French	.548±.126
Physical education for women	.510±.094
Entire group	.507±.027
English	.506±.048
Commerce	.487±.052
Music	.470±.088
Art	.468±.089
Science	.275±.076
Physical education for men	.213±.101
Industrial arts	.115±.100

CHAPTER III

SUMMARY AND CONCLUSIONS

This chapter summarizes and announces the conclusions drawn from the established differences in the intellectual abilities of the students of the various departments at Indiana State Teachers College. Related studies which would likely be valuable in the training of teachers are suggested.

I. SUMMARY

The qualities of the intellectual abilities of groups of students in the various major departments are significantly different from the quality of the intellectual ability of the entire group. The students of French, Latin, and English have definitely higher quality of intellectual ability than that of the entire group. The intellectual abilities of students majoring in home economics, industrial arts, and physical education for men were lower than that of the entire group. The intellectual abilities of the other groups vary less distinctly from the intellectual ability of the entire group.

In general the scholarship indices of the groups vary with the quality of the intellectual abilities. For individuals in most of the groups there was normal or low correlation between intellectual ability and scholarship index.

The only exception was the elementary education group whose coefficient of correlation for these two factors was rather high.

II. CONCLUSIONS AND SUGGESTIONS FOR OTHER INVESTIGATIONS

From this study it is concluded that the intellectual ability of students in each of the various major departments does vary from that of the entire group. Therefore, the entering student should be guided to select major fields whose mean percentile ranks in intelligence do not deviate far from his own percentile rank in intelligence.

Similar studies in other teachers' colleges would be valuable for substantiating the means revealed in this study. Another interesting and valuable study would be a detailed investigation of the group whose percentile ranks in intelligence were included in the lowest 10 per cent of the entire group. If it were found that this group did not consistently earn scholarship indices which were in the lowest 10 per cent of the entire group of scholarship indices, a study of the group whose scholarship indices were in the lowest 10 per cent would also be interesting.

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